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Benefits of Active Flow Control for Wind Turbine Blades GUANNAN WANG, BASMAN ELHADIDI, JAKUB WALCZAK, Syracuse University, MARK GLAUSER, Syracuse University, HIROSHI HIGUCHI, Syracuse University — In this talk, the blade element momentum model is used to design a wind turbine and examine the benefit of active flow control. The results suggest that either the overall operational range of the wind turbine could be effectively enlarged by 80% with the same rated power output or the rated output power could be increased by 20% while maintaining the same level of operational range when the control is on. The optimal location for the actuator is found to be on the outboard of the blade beyond half of the radius. In light of these encouraging results and based on our earlier NACA 4412 flow control studies, a characteristic airfoil (e.g. DU-96-W-180) is being tested in a new anechoic wind tunnel facility at Syracuse University to determine the airfoil lift and drag characteristics with appropriate flow control while exposed to large scale flow unsteadiness. In addition, the effects of flow controllers on the noise spectrum of the wind turbine will be also assessed and measured in the anechoic chamber.

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